

Name:

~~Mr. Davis~~ Mr. Davis

Solutions

1. What is the increasing pattern for the parabola with equation $f(x) = x^2 + 6x$?

1, 3, 5, 7, ...

2. What is the increasing pattern for the parabola with equation $f(x) = 2x^2 + 6x$?

2, 6, 10, 14, ...

3. What is the increasing pattern for the parabola with equation $f(x) = \frac{1}{2}x^2 + 6x$?

$\frac{1}{2}, \frac{3}{2}, \frac{5}{2}, \frac{7}{2}, \dots$

4. What is the increasing pattern for the parabola with equation $f(x) = 3x^2 + 6x$?

3, 9, 15, 21, ...

5. Given the quadratic function $f(x) = x^2$?

- a. Write the equation for the axis of symmetry. $x = 0$

- b. Write the coordinates of the vertex.

$V(0,0)$

- c. Write the coordinates of the y-intercept.

$(0,0)$

- d. Write the coordinates of the x-intercept(s).

$(0,0)$

- e. State whether the parabola is concave up or concave down.

$a = 1$

concave up

- f. State whether the vertex is a maximum point or a minimum point.

minimum point

- g. State the range of the function.

$y \geq 0$

6. Given the quadratic function $f(x) = -x^2 + 4$? *Standard Form*

a. Write the equation for the axis of symmetry.

$$x=0$$

$$-x^2 + 4 = 4 - x^2 = (2-x)(2+x)$$

$x=2 \quad x=-2$

b. Write the coordinates of the vertex.

$$v(0, 4)$$

c. Write the coordinates of the y-intercept.

$$x=0 \quad f(0) = -(0)^2 + 4 = 4 \quad (0, 4)$$

d. Write the coordinates of the x-intercept(s).

$$(2, 0) \text{ \& } (-2, 0)$$

$$y=0 \quad 0 = -x^2 + 4 = 4 - x^2 = (2-x)(2+x)$$

e. State whether the parabola is concave up or concave down.

$$a = -1$$

Concave down

f. State whether the vertex is a maximum point or a minimum point.

maximum point

g. State the range of the function.

$$y \leq 4$$

7. Given the quadratic function $f(x) = (x+2)(x+6)$? *Factored Form*

$$x = -2 \quad x = -6$$

a. Write the equation for the axis of symmetry.

$$x = -4$$

b. Write the coordinates of the vertex.

$$f(-4) = (-4+2)(-4+6) = (-2)(2) = -4 \quad v(-4, -4)$$

c. Write the coordinates of the y-intercept.

$$x=0 \quad f(0) = (0+2)(0+6) = (2)(6) = 12 \quad (0, 12)$$

d. Write the coordinates of the x-intercept(s).

$$y=0 \quad 0 = (x+2)(x+6) \quad (-2, 0) \text{ \& } (-6, 0)$$

negative

e. State whether the parabola is concave up or concave down.

$$f(x) = x^2 + 8x + 12 \quad a = 1 \quad \text{concave up}$$

f. State whether the vertex is a maximum point or a minimum point.

minimum point

g. State the range of the function.

$$y \geq -4$$

8. Given the quadratic function $f(x) = 2(x+1)^2 - 8$?

a. Write the equation for the axis of symmetry.

$$x = -1$$

b. Write the coordinates of the vertex.

$$V(-1, -8)$$

c. Write the coordinates of the y-intercept.

$$x=0 \quad f(0) = 2(0+1)^2 - 8 = 2(1) - 8 = -6 \quad (0, -6)$$

d. Write the coordinates of the x-intercept(s).

$$y=0 \quad 0 = 2(x+1)(x+1) - 8 = 2(x^2 + 2x + 1) - 8 = 2x^2 + 4x + 2 - 8 \quad (-3, 0)$$

e. State whether the parabola is concave up or concave down.

$$a = 2 \quad \text{concave up}$$

f. State whether the vertex is a maximum point or a minimum point.

minimum point

g. State the range of the function.

$$y \geq -8$$

9. Identify the quadratic function that is in factored form

a. $f(x) = 2x^2 - 5x + 1$

b. $f(x) = (x-5)^2 + 7$

c. $f(x) = 2(x-1)(x+3)$

10. Identify the quadratic function that is in standard form

a. $f(x) = 2x^2 - 5x + 1$

b. $f(x) = (x-5)^2 + 7$

c. $f(x) = 2(x-1)(x+3)$

11. Identify the quadratic function that is in vertex form

a. $f(x) = 2x^2 - 5x + 1$

b. $f(x) = (x-5)^2 + 7$

c. $f(x) = 2(x-1)(x+3)$

12. Convert the quadratic function $f(x) = 2(x-1)(x+3)$ to standard form

$$f(x) = 2(x^2 + 3x - x - 3) = 2(x^2 + 2x - 3) = 2x^2 + 4x - 6$$

$$f(x) = 2x^2 + 4x - 6$$

13. Convert the quadratic function $f(x) = (x-5)^2 + 7$ to standard form

$$f(x) = (x-5)(x-5) + 7 = x^2 - 10x + 25 + 7 = x^2 - 10x + 32$$

$$f(x) = x^2 - 10x + 32$$

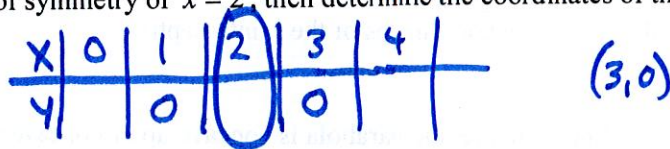
14. Convert the quadratic function $f(x) = x^2 + 7x + 12$ to factored form

$$f(x) = (x+3)(x+4)$$

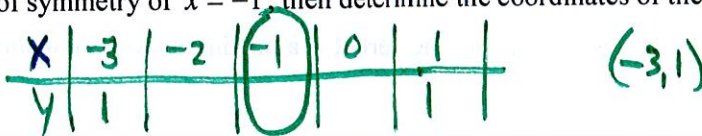
15. Convert the quadratic function $f(x) = x^2 + 10x + 21$ to vertex form

$$\begin{aligned} f(x) &= x^2 + 10x + 21 & y + 25 &= x^2 + 10x + 25 + 21 \\ y + 25 &= (x+5)(x+5) + 21 & y &= (x+5)^2 + 21 - 25 & y &= (x+5)^2 - 4 \end{aligned}$$

16. If a parabola has an axis of symmetry of $x = 2$, then determine the coordinates of the twin point to the point $(1, 0)$



17. If a parabola has an axis of symmetry of $x = -1$, then determine the coordinates of the twin point to the point $(1, 1)$



18. On graph paper, neatly graph the parabola with quadratic equation $f(x) = x^2 - 4$

19. On graph paper, neatly graph the parabola with quadratic equation $f(x) = (x+3)^2 - 4$

$$V(-3, -4)$$

20. On graph paper, neatly graph the parabola with quadratic equation $f(x) = (x+1)(x-5)$

$$(-1, 0) \quad (5, 0) \quad V(2, -9)$$

21. A parabola has vertex $V(2, -1)$ and y-intercept $P(0, 3)$. On graph paper, graph a parabola with these descriptors. Are there multiple ways to draw the parabola or is there only one way?

one way only

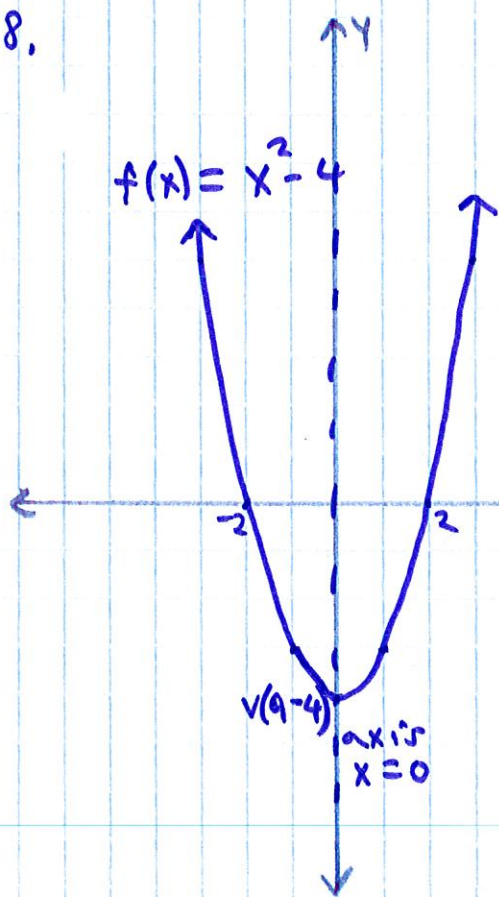
22. A parabola has axis of symmetry $x = -2$ and x-intercept $P(-4, 0)$. On graph paper, graph a parabola with these descriptors. Are there multiple ways to draw the parabola or is there only one way?

multiple ways

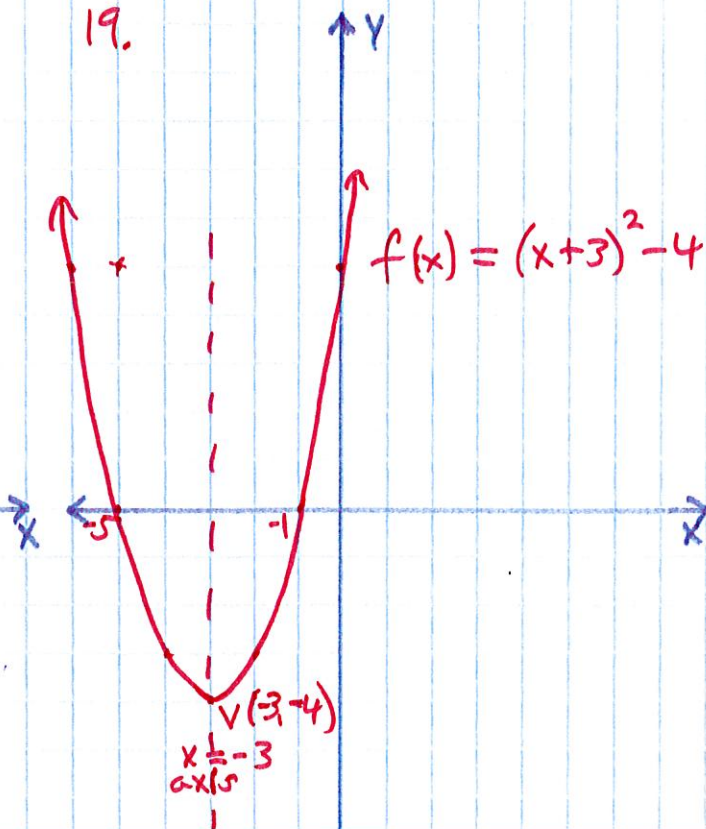
23. A parabola has x-intercepts $P(-1, 0)$ and $Q(3, 0)$ and third point $R(4, -5)$. On graph paper, graph a parabola with these descriptors. Are there multiple ways to draw the parabola or is there only one way?

one way only

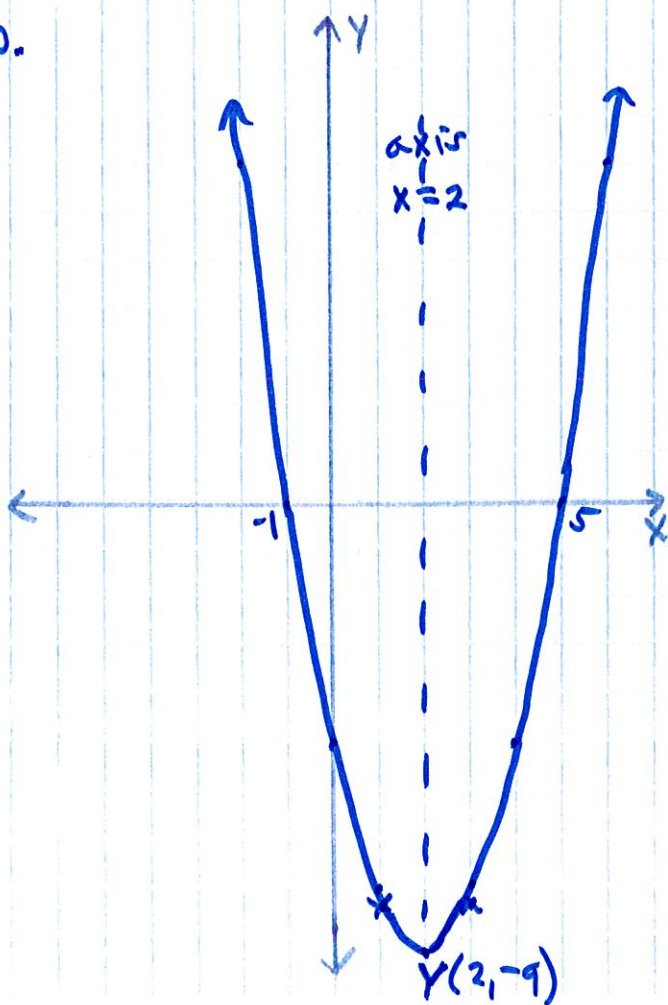
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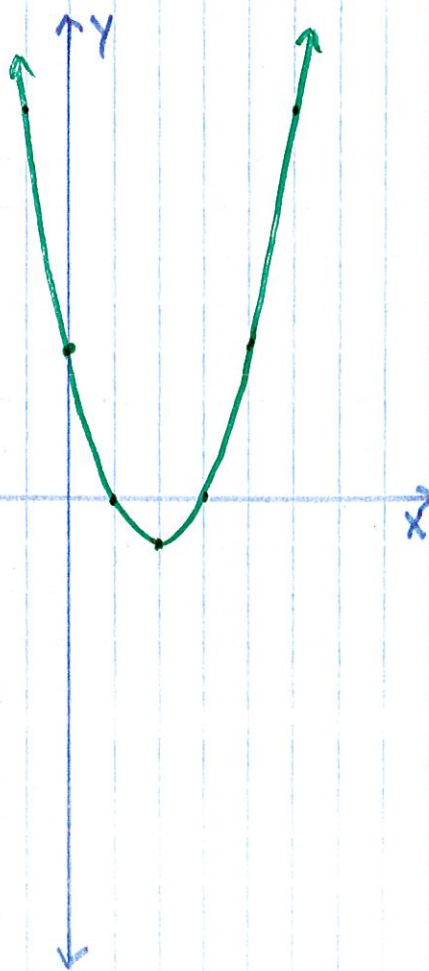
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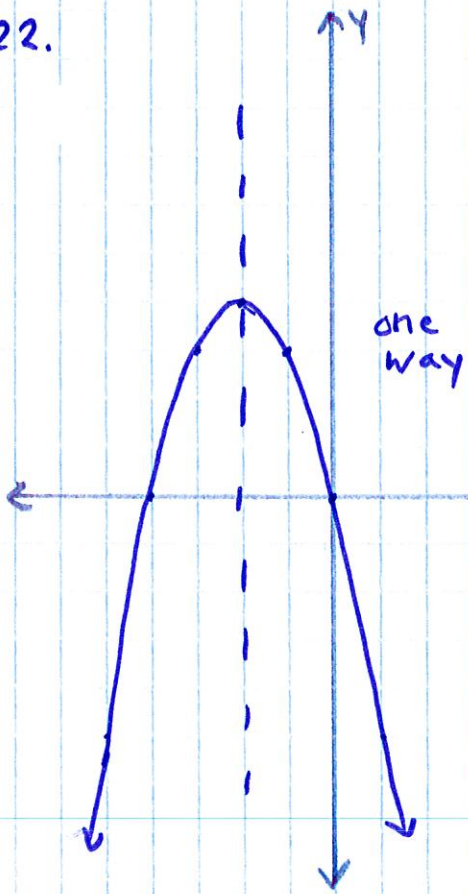
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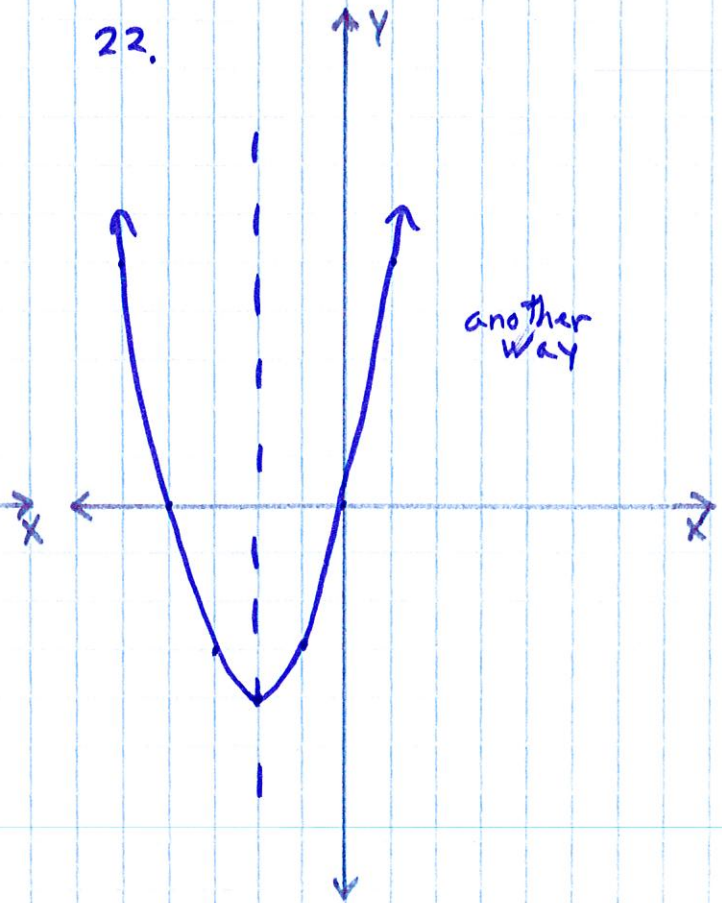
21.



22.



22.



23.

